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AI-Assisted Social Skills Training for Preschool Children with ASD: A Study on Early Psychological Interventions

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Early behavioural and psychological interventions are crucial for supporting the social development of preschool children diagnosed with autism spectrum disorder (ASD), as such interventions have a significant impact on their future development. Despite increasing recognition of the importance of these interventions, there remains a notable gap in research concerning the application of artificial intelligence (AI) in delivering social skills training to children with ASD. This study investigates the potential of AI technologies to enhance the effectiveness of social skills development programmes for preschool children with ASD within early intervention frameworks. To address this gap, a systematic literature review (SLR) was undertaken to compile and analyse existing studies on AI-supported interventions designed to promote the social abilities of young children with ASD. The study examines the role of emerging technologies, including virtual reality, machine learning, and interactive platforms, in fostering improved social engagement and communication among this population. The review highlights that AI-based educational activities contribute to improved learning experiences by offering timely, supportive, and individualised instruction for children with ASD. These approaches enable immediate feedback and practical application of social learning scenarios, leading to positive outcomes in both social competence and behavioural adjustment. Nonetheless, challenges persist regarding accessibility, cultural adaptation, and the long-term sustainability of these technologies. The study concludes that AI holds significant promise in supporting the early stages of structured psychological interventions for children with ASD, particularly in enhancing social skills training and contributing to better quality of life. Further research is necessary to advance these AI-driven interventions and to examine their practical integration into therapeutic practices.

Keywords: Preschool Children, Social Skills, Artificial Intelligence, Psychological

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Intervention, Autism Spectrum Disorder

Introduction

The integration of artificial intelligence (AI) across multiple domains has accelerated markedly in recent decades, bringing transformative developments in sectors such as healthcare, education, and social services. Among these applications, the use of AI within psychological and behavioural interventions for children with ASD has increasingly captured scholarly and clinical interest (Jing, 2019). ASD is recognised as a neurodevelopmental condition that manifests through persistent difficulties in social communication and interaction (AlSalehi & Alhifthy, 2020). Given that ASD represents one of the most prevalent developmental disabilities, the significance of early diagnosis and intervention is widely acknowledged. In this context, AI-driven solutions, including virtual reality (VR), machine learning (ML), and interactive systems, are emerging as promising tools for enhancing the social communication skills of preschool children with ASD during early intervention efforts (Barua et al., 2022). These technologies are designed to offer personalised, adaptive, and interactive environments that may foster improved social functioning and overall wellbeing for children on the spectrum.

Timely behavioural and psychological interventions are indispensable in supporting the development of children with ASD. Research consistently indicates that earlier interventions are associated with greater gains in social communication and adaptive skills (Landa, 2018). Interventions targeting preschool-aged children are particularly critical, as these years are essential for cultivating social competencies, an area where many children with ASD experience significant difficulties. Such challenges typically involve interpreting social cues, forming reciprocal social relationships, and communicating effectively. Although the promise of AI in assisting children with ASD is well noted, substantial gaps remain regarding its practical implementation and effectiveness in everyday environments. While AI-based programmes have shown encouraging results within controlled research contexts, further rigorous, large-scale studies are necessary to evaluate their long-term impact and adaptability across different settings. Additionally, concerns regarding accessibility, cultural suitability, and the sustainability of AI interventions continue to present major barriers that must be addressed for broader adoption. These issues are particularly pertinent given the diverse socioeconomic and cultural landscapes in which children with ASD reside, as well as the disparities in technological resources and support systems that exist across regions.

The central research problem addressed in this study concerns the insufficient examination and synthesis of AI-supported interventions aimed at enhancing the social abilities of preschool children with ASD. Despite the demonstrated potential of AI technologies to assist in the development of social skills, there is a pressing need for deeper insights into how these innovations can be effectively incorporated into early psychological support strategies (Hughes et al., 2022). In response, this paper conducts a SLR to consolidate findings on AI-based interventions for children with ASD, examining their efficacy, challenges, and future directions. The review particularly focuses on how technologies such as VR, ML, and interactive systems contribute to improving social behaviours and skills in this population.

The objective of this study is to critically assess the existing research on AI-based social skills training for preschool children with ASD and to explore the implications of these technologies for early psychological intervention. Furthermore, the study aims to identify the limitations and barriers associated with AI interventions, including issues related to access, cost, and cultural relevance. By mapping the existing literature and discussing the findings, this paper seeks to advance current discourse on the role of AI in early ASD intervention and to highlight priorities for future research and practical application.

Literature Review

ASD and the Role of Early Psychological Interventions

ASD is a condition that significantly alters an individual's patterns of social interaction, communication, and behaviour (Kamruzzaman et al., 2019). It is characterised by interpersonal challenges, difficulties in effective communication, and the presence of repetitive and restrictive behaviours, which is why timely intervention is essential for achieving the best developmental outcomes. The preschool period represents a critical neurodevelopmental phase, during which early interventions can greatly enhance social, emotional, and cognitive skills. This, in turn, can support children with ASD in integrating more successfully into mainstream education and broader social settings (Duncan & Matthews, 2018). Common approaches aimed at addressing these developmental challenges include applied behavioural analysis (ABA) and social skills training (SST). Growing interest in ASD interventions has led to an expansion of research exploring how technological innovations, particularly AI, can contribute to early support strategies. Recent work has highlighted promising outcomes from the use of ML algorithms and interactive AI systems in delivering accessible, personalised, and effective SST for preschool-aged children with ASD (Adako et al., 2024).

Advancements in AI for Educational and Psychological Interventions

AI has emerged as a transformative force in sectors such as education and psychology (Dakanalis et al., 2024). Its application to SST for children with ASD offers opportunities to create engaging, personalised, and dynamically adaptive learning environments. AI tools employing technologies such as ML, natural language processing, and computer vision can continuously monitor and adjust their responses according to the child's immediate needs. In educational contexts, AI-driven platforms have been shown to increase engagement by tailoring tasks based on individual performance levels and providing immediate guidance. These features are particularly beneficial for children with ASD, for whom acquiring social skills in natural environments can be especially challenging (Terlouw et al., 2020). Technology-supported platforms give these children the opportunity to practise social scenarios repeatedly in a safe, non-threatening manner. Although AI has shown considerable success in educational contexts, its integration into ASD treatment requires careful design and planning.

Social Skills Training and Its Importance in ASD Interventions

SST forms a core element of intervention strategies designed to enhance the social communication abilities of children with ASD (Dekker et al., 2019). Many children on the spectrum encounter difficulties in interpreting social cues, understanding nonverbal signals, and maintaining reciprocal interactions, which can limit their participation in social situations. Traditional approaches such as role-play, video modelling, and social stories have been widely applied to support these skills (Pilnick et al., 2018). However, the reliance on direct human interaction can present challenges in terms of scalability and long-term sustainability. AI-supported SST addresses these limitations by offering flexible, adaptable learning opportunities that can be accessed when needed. Studies have demonstrated that such tools can effectively foster specific social behaviours, including appropriate eye contact, making introductions, and recognising facial expressions (Eaves & Leathers, 2017). Nevertheless, concerns remain regarding the depth and authenticity of social exchanges facilitated by AI. While AI has the potential to enhance social learning experiences, it does not yet match the nuanced emotional engagement and immediacy provided by human therapists or caregivers (Fiske et al., 2019). These limitations underscore the importance of integrating AI with conventional therapeutic methods to support the comprehensive development of social skills.

Effectiveness of AI-Assisted Social Skills Training for Preschool Children with ASD

Research into the impact of AI-assisted interventions for preschool children with ASD has produced mixed findings (Mehta et al., 2023). Certain studies suggest that AI-supported SST can significantly enhance children's social engagement, with improvements observed in behaviours such as initiating and sustaining eye contact (Bakır, 2024). AI technologies can offer tailored feedback that encourages positive behaviours and helps maintain motivation. The highly individualised nature of ASD means that personalised strategies are often required, and AI systems are well placed to provide these.

Challenges and Future Directions in AI-Assisted Social Skills Training

Despite its potential, several challenges must be addressed to embed AI-based SST into routine therapeutic practice (Sethi & Jain, 2024). A key issue is the absence of standardised frameworks for evaluating the performance of AI systems within ASD therapy. The diversity of AI tools applied, including robotic avatars and VR applications, complicates efforts to make direct comparisons between studies (Genay et al., 2021). Collaboration between psychologists, AI specialists, and developers is essential in designing AI interventions that can effectively support children with ASD in their social development. Future research should focus on examining how AI technologies can complement established therapeutic methods, such as behavioural and speech-language therapies, to maximise their effectiveness. Overcoming these challenges will be central to ensuring the successful integration of AI into early psychological support strategies for children with ASD.

Literature Gap

Although efforts to implement early interventions for children with ASD are increasing, there remains limited evidence regarding how AI can assist in enhancing social skills among preschool-aged children. Many existing studies fail to address the long-term viability, cultural adaptability, and practical application of AI interventions, creating uncertainty about their overall effectiveness within therapeutic contexts.

Research Methodology

Research Method

This study employed a qualitative methodology, as it aimed to explore and gain in-depth insights into the experiences, perceptions, and outcomes associated with AI-supported social skills training for preschool children diagnosed with ASD. The qualitative approach was well suited to investigating this subject because it focused on the subjective experiences of children, caregivers, and professionals involved in early psychological

interventions. Through this method, the research was able to generate a comprehensive understanding of the mechanisms and influence of AI-assisted strategies in fostering social skill development among preschool-aged children with ASD.

Research Design

Drawing upon the findings of the literature review, the study was structured as an SLR to synthesise and critically assess the existing body of evidence concerning AI-supported interventions aimed at social skills enhancement in children with ASD. The SLR approach made it possible to examine the current research landscape in depth, identify emerging trends, reveal gaps in knowledge, and evaluate the methodological strengths and limitations within the literature (Chukwuere, 2023). The review provided a summary of outcomes from studies that incorporated AI technologies into psychological support for preschool children with ASD, offering analysis on the effectiveness, challenges, and opportunities for refinement in this area.

PRISMA Framework

To ensure that the review process was transparent and replicable, the study adhered to PRISMA standards. The PRISMA framework offers a structured and uniform approach to conducting and reporting systematic reviews, ensuring that both the process and findings are presented in a clear and consistent manner.

Data Collection

Following the PRISMA guidelines, the SLR was designed to maintain a clear structure and rigorous procedure. The literature search was conducted using leading academic databases, including Web of Science, IEEE Xplore, and Google Scholar, to source articles and conference papers published in peer-reviewed venues. The search process employed keywords linked to AI, SST, ASD, and preschool-aged children, which initially generated 312 records. After removing duplicates (n = 42), 270 studies were screened through their titles and abstracts. Of these, 190 were excluded as they did not meet the inclusion criteria, leaving 80 articles for full-text review. A further 44 papers were removed at this stage because they either did not focus on preschool-aged participants or lacked relevance to AI applications. Ultimately, 16 studies were selected for final analysis, as they specifically examined AI-supported social skills development in preschool children with ASD. The key data extracted from these studies included:

1. The type of AI technology applied, such as VR, ML, or interactive systems.

2. The age range and diagnostic status of participants.
3. Documented changes in social and behavioural outcomes following intervention.

The collected data were systematically organised to enable the identification of shared themes and key findings. A detailed PRISMA flow diagram was prepared to illustrate the study selection process applied in this review.

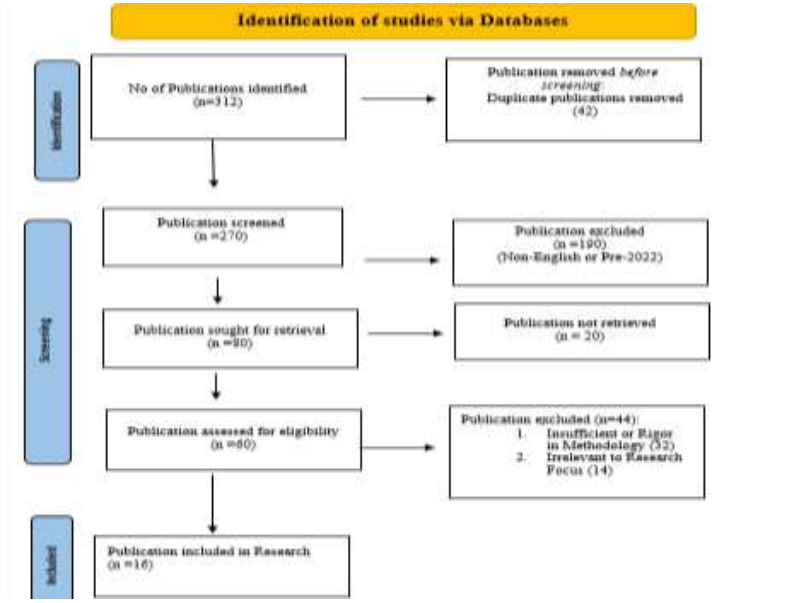

Figure 1: PRISMA Flow Diagram

The Inclusion Criteria

The studies considered in this review were expected to possess the following defining attributes as shown in Table 1.

Table 1

Inclusion Criteria

Subjects	Features
Population	Preschool children between the ages of 3-5 diagnosed with ASD.
Intervention	Use of AI-based tools or platforms that are used to enhance the social skills of children with ASD.
Study Type	Peer-reviewed experimental studies, case studies, and qualitative research that evaluate AI-driven interventions as applied to social skills training.
Language	Studies published in English.
Timeframe	Studies released during the past 10 years (2015-2025), which will make the findings applicable to AI technology today.

The Exclusion Criteria

Studies were excluded from the review if they met any of the following criteria as shown in Table 2.

Table 2

Exclusion Criteria

Features	Reasons
Non-Relevant Populations	Research with children of more than 5 years of age and those without an ASD diagnosis.
Lack of AI-Focused Intervention	Point of studies that do not use AI-assisted ways of social skills training.
Non-Peer-Reviewed Sources	Grey Literature, such as reports, and dissertations, which are not peer-reviewed with rigor.
Irrelevant Focus	Research on other areas of children's development (e.g., cognitive/motor skills) but not on a specific focus of social skills or emotional regulation.

Justification of Methodological Choices

The choice of a qualitative research strategy was driven by the need to investigate the complex and multifaceted impacts of AI-based interventions on children with ASD. Qualitative methods enable in-depth exploration of the personal experiences and perspectives of those involved, which is essential for gaining meaningful insights into the function of AI within early intervention contexts (Lim, 2025). Additionally, the adoption of an SLR approach aimed to deliver a thorough and evidence-based synthesis of existing research. This method was intended to support the identification of effective intervention practices and to highlight gaps in current knowledge regarding AI-supported SST for preschool children with ASD.

Data Analysis Techniques

Thematic Analysis

In conducting the thematic analysis, the researcher identified and examined recurring patterns within the qualitative data drawn from the selected studies included in the SLR. This approach facilitated the organisation and interpretation of key research findings, drawing attention to prevailing trends, knowledge gaps, and connections within the literature. Through careful review of the data, the researcher formulated themes and applied systematic coding procedures to ensure a balanced and comprehensive evaluation of the existing evidence base.

Ethical Considerations

Ethical considerations hold central importance in this type of research, particularly given the involvement of children with ASD. For this review,

it was essential that all included studies had received approval from a recognised ethics committee, thereby ensuring that participants' rights, dignity, and welfare were upheld throughout. Core ethical principles, including obtaining informed consent from parents or legal guardians and maintaining strict confidentiality of participant data, were required to be observed. In addition, attention was given to the ethical responsibilities associated with working with vulnerable groups, as well as the potential developmental implications of AI-based interventions. The review also examined how the selected studies addressed concerns related to the long-term effects of AI technologies on participating children.

Findings and Analysis

This section presents the results of a study that examined the application of AI in supporting social skill development among preschool children diagnosed with ASD. The investigation centred on three main dimensions: the effectiveness of early therapeutic interventions, the role of AI in enhancing communication abilities, and the ongoing influence of these approaches on children's social growth over time. The analysis aimed to assess how technological tools contribute to equipping young children with essential social competencies.

Selected Studies for Analysis

Table 3 presents the sixteen studies that were chosen for detailed data analysis. The themes identified within the findings of these studies correspond closely with the aims of the present research.

Table 3

SLR Studies for Analysis

Citation	Aim or Title	Findings	Codes
Zhang (2025)	AI-Assisted Early Screening, Diagnosis, and Intervention for Autism in Young Children	AI enhances diagnostic precision and enables the provision of tailored interventions in ASD care.	Screening, Diagnosis, Personalized Intervention
Shen et al. (2024)	Assessment and Intervention for Children with Autism: Are AI Technology Interventions Effective?	AI strengthens social abilities, encourages positive behaviours, and creates stimulating learning settings.	Social Skills, Educational Technology
Jaliaawala and Khan (2020)	Can Autism be Catered with Artificial Intelligence-Assisted Intervention Technology?	AI-based solutions aid communication development and complement conventional therapies in addressing ASD symptoms.	Communication Skills, Machine Learning
Patil and Singh (2023)	Improvements in Artificial Intelligence	AI facilitates personalised and flexible treatments, supporting psychological and	Behavioural Modelling, Adaptive Intervention

	and Its Impact on Child Psychology	developmental gains in children with ASD.	
Guillén-Martínez et al. (2025)	Exploring the Potential of Artificial Intelligence in Special Education	AI technologies enrich learning experiences for children with ASD, though further exploration is required.	AI in Education, Inclusive Learning
Chanyoung et al. (2022)	AI-Assisted Initiation to Joint Attention Evaluation for Autism Spectrum Disorder Detection	AI tools offer precise, data-based assessments of joint attention, supporting early detection of ASD.	Joint Attention, Early Detection
Li et al. (2024)	Teachers and Educators' Experiences and Perceptions of Artificial-Powered Interventions for Autism Groups	AI interventions assist teachers in managing classroom dynamics and delivering individualised support for children with ASD.	Educator Experiences, Classroom Support
Bertacchini et al. (2023)	A Social Robot Connected with ChatGPT to Improve Cognitive Functioning in ASD Subjects	AI robots integrated with ChatGPT promote social participation and improve emotional recognition among children with ASD.	Cognitive Functioning, Social Robots
Liu and Sun (2024)	Personalized Remote Intervention for Children with Autism	AI-powered remote interventions combined with augmentative and alternative communication enhance engagement and foster social interaction through tailored feedback.	Remote Intervention, Augmentative Communication, Personalized Feedback
Wang and Hu (2023)	The Application of Artificial Intelligence in the Recognition, Diagnosis, and Treatment of Autism	AI technologies contribute to early diagnosis of autism, improving the accuracy and methods of treatment, and help identify communication and social challenges.	Early Diagnosis, AI Recognition Tools, Treatment Optimization
Naser et al. (2021)	Artificial Intelligence (AI) and autism Spectrum Disorder (ASD)	Advanced personalised therapy and data-driven approaches play a key role for AI in enhancing children's social interaction abilities and predicting developmental pathways.	Personalized Therapy, AI-Driven Predictive Models, Early Intervention
Nasrallah et al. (2025)	The Emerging Role of Artificial Intelligence in the Diagnosis and Treatment of ASD	AI systems introduce innovative methods for diagnosis and intervention.	Personalized Interventions, Cognitive Enhancement, Social Skills Training
Hussein et al. (2025)	Applications of AI in Special Education	AI tools adapt educational practices and support the social skills development of children with ASD, thereby advancing personalised learning.	Personalized Education, Special Education, AI Tools

Tang et al. (2024)	Applying Generative Artificial Intelligence to Emotional Learning for Children with High-Function Autism	Emoeden assists children with ASD in recognising and responding to emotional situations, improving emotional learning and social competence.	Emotional Learning, AI-Driven Tools, Social Skills
Koegel et al. (2025)	Using AI to Improve Empathetic Statements in Autistic Adolescents and Adults	AI-generated empathetic responses help foster social interaction and communication abilities in adolescents and adults with ASD.	Empathy Training, Communication Improvement, AI Applications
Iannone and Giansanti (2023)	Breaking Barriers: The Intersection of AI and Assistive Technology in Autism Care	AI delivers customised interventions that help overcome barriers to autism care by offering personalised assistance to strengthen communication and social skills.	Personalized Interventions, Assistive Technology, Communication

Theme 1: AI in Early Diagnosis and Personalized Intervention for ASD

This body of research investigates how AI can facilitate the early identification and diagnosis of ASD. It highlights that AI integration within healthcare enables the adaptation of treatment strategies to better address the individual needs of each child. Such technological advancements contribute towards more effective clinical support by aligning interventions with the specific developmental stages of children. In AI-supported interventions for children with ASD, the studies reviewed illustrate diverse applications, effectiveness, and potential benefits linked to early psychological support. The research conducted by Zhang (2025) examined the use of AI in screening, diagnosing, and treating ASD in young children. The findings identified AI as a valuable tool for improving the accuracy of early autism diagnosis, providing clearer insights into the characteristics of ASD. Moreover, the study emphasised the potential for AI to assist in the creation of real-time personalised intervention strategies that reflect each child's individual interests. The outcomes demonstrated that AI offers valuable assistance to clinicians by supplying data that can inform early intervention planning (Zhang, 2025).

A central theme across this literature is the role of AI in fostering the social and communication abilities of individuals with ASD. AI technologies aim to establish interactive settings that promote positive behavioural patterns and skill acquisition. Their incorporation into educational contexts helps children with special needs access learning opportunities more effectively and successfully. Shen et al. (2024) undertook a review exploring AI within educational technology interventions for children diagnosed with ASD. Their findings indicated that AI has the capacity to substantially enhance social engagement and

behavioural competencies in preschool-aged children. AI-based educational platforms were found to provide engaging, adaptive learning environments, particularly in relation to social skills development. The study also noted certain challenges in delivering these technologies in ways that ensure broad accessibility and applicability (Shen et al., 2024).

Another theme focuses on the application of AI and ML in supporting communication development in children with ASD. This involves the creation of technological tools designed to advance language acquisition and facilitate interaction, often working alongside established therapeutic methods. Such technologies aim to strengthen communication skills and promote greater inclusion within the wider community for individuals with ASD. Jaliaawala and Khan (2020) conducted a broad survey of AI-assisted intervention technologies for ASD. Their research identified that AI systems, including ML models, speech recognition tools, and behavioural analysis technologies, contributed positively to the development of communication skills. The authors concluded that AI could effectively complement traditional therapeutic approaches by delivering consistent, data-driven support to children with ASD (Jaliaawala & Khan, 2020). Patil and Singh (2023) explored the growing presence of AI within child psychology, particularly regarding developmental conditions such as ASD. Their study highlighted how behavioural modelling and intervention techniques have been strengthened through AI applications. It also pointed to the growing role of AI in enabling more tailored and adaptive interventions for children diagnosed with ASD (Patil & Singh, 2023).

Theme 2: AI-Assisted Social Skills Training and Cognitive Functioning

The application of AI in supporting social skills development among preschool children with ASD has been the focus of various studies, which have examined its impact on cognitive abilities, social engagement, and educational support mechanisms. Bertacchini et al. (2023) investigated the use of social robots integrated with ChatGPT and reported that such AI-supported technologies can contribute to enhancing cognitive functioning in children with ASD. Their findings suggested that AI-driven social robots play a valuable role in fostering emotional understanding and communication abilities, thereby encouraging greater social participation among these children (Bertacchini et al., 2023). Li et al. (2024) examined the perspectives of educators regarding the integration of AI-based tools into their teaching practices. Their research highlighted the potential of AI technologies to provide tailored interventions that assist educators in managing classroom environments and delivering personalised learning experiences to children with ASD. However, they

also pointed out challenges related to adequately preparing teachers to effectively implement and utilise these tools (Li et al., 2024).

In relation to early identification of ASD, Chanyoung et al. (2022) explored the use of AI in assessing joint attention behaviours, a key area often affected in children with ASD. Their study demonstrated that AI-supported evaluations offered objective, data-driven insights that could inform the design of timely and precise intervention strategies (Chanyoung et al., 2022). The integration of AI technologies has the potential to enhance special education systems by providing additional support to both learners and educators. The authors indicated that while AI may offer promising solutions to strengthen inclusive education for children with ASD, further research is necessary to evaluate its long-term effectiveness in this context (Guillén-Martínez et al., 2025).

Theme 3: AI-Driven Early Diagnosis and Personalized Intervention for Social Skills

The integration of AI into SST for children diagnosed with ASD holds significant potential to reshape early psychological interventions. AI technologies provide tailored, data-informed approaches that can substantially advance the development of social skills in preschool children with ASD, addressing fundamental challenges such as communication difficulties and limited social interaction. Regarding early identification, Wang and Hu (2023) explored the contribution of AI in recognising communication and social difficulties during the initial stages of a child's development. Their work indicated that employing AI-supported assessment tools allows for the introduction of earlier interventions, ultimately leading to improved therapeutic outcomes. Similarly, Nasrallah et al. (2025) emphasised that AI-based systems enable interventions to be customised to each child's specific requirements. These personalised methods promote gains in cognitive and social functioning by delivering adaptive feedback and targeted support, especially within educational environments.

Further extending this line of inquiry, Naser et al. (2021) examined how AI can predict developmental progress. Their study demonstrated that AI models are capable of forecasting the outcomes of particular interventions, thereby supporting the optimisation of SST strategies. Liu and Sun (2024) investigated the combined use of AI-driven remote interventions and augmentative and alternative communication tools, showing how these approaches help to strengthen social behaviours and ensure consistent support beyond clinical settings. Together, these studies illustrate the capacity of AI to foster adaptive, individualised, and widely accessible interventions that significantly enhance SST for children with ASD.

Theme 4: Emotional Learning and Social Skills Development through AI

The incorporation of AI into SST for preschool children diagnosed with ASD has demonstrated significant potential in strengthening early psychological interventions. Recent research has sought to explore how AI can support children with ASD, with a particular emphasis on promoting social development and communication skills. Tang et al. (2024) introduced Emoeden, an AI-supported tool for emotional learning, emphasising how generative AI can simulate emotional scenarios and guide children with high-functioning autism (HFA) in producing suitable emotional responses. This tool shows promise in assisting children with recognising emotions and enhancing social interactions, both of which are essential developmental areas for those with ASD. Koegel et al. (2025) examined the use of AI to promote empathetic communication in adolescents and adults with ASD. Their findings indicated that AI systems can be designed to generate empathetic statements, which in turn support the development of better social interactions and higher quality social exchanges.

Discussion

AI-supported social competency training for preschool children with ASD represents a promising avenue for advancing early psychological interventions. The consistent outcome across the reviewed studies indicates that AI contributes meaningfully to the development of social and communication abilities in children with ASD. Zhang (2025) and Patil and Singh (2023) highlighted the capacity of AI to support personalised treatment strategies, while Shen et al. (2024) noted the promise of AI within educational environments. Despite these advantages, Shen et al. (2024) also pointed to the challenges associated with ensuring the availability and universal applicability of AI-based tools. The evidence suggests that integrating AI alongside traditional therapeutic practices enhances the effectiveness of interventions. Therefore, AI is best positioned as a supportive element rather than a substitute for human interaction in early interventions. There remains a pressing need for additional research and technological refinement to ensure that AI-driven solutions become accessible to all children with ASD.

The reviewed studies collectively demonstrate that AI-based interventions hold considerable promise for enhancing both social skills and cognitive growth in pre-schoolers with ASD. Bertacchini et al. (2023) discussed how AI-assisted social robots can facilitate emotional recognition, a key component of effective social engagement. Li et al. (2024) provided evidence that AI tools deployed within classroom settings can empower educators to deliver more tailored support to

individual pupils. Furthermore, Chanyoung et al. (2022) highlighted the role of AI in the early identification of joint attention deficits, a crucial element in the diagnostic process for ASD. Nonetheless, there remain barriers to the broader adoption of these technologies within mainstream educational frameworks.

The findings of these studies underscore the growing utilisation of AI in the detection, intervention, and social skills development of children diagnosed with ASD. Technologies incorporating machine learning and natural language processing have been shown to support early identification, which is critical for implementing timely interventions during key developmental stages. For example, Wang and Hu (2023) demonstrated how AI technologies could enhance treatment by identifying subtle deficits in social communication that are often difficult to detect using conventional methods. Similarly, Nasrallah et al. (2025) emphasised the value of AI systems in creating tailored interventions that evolve in response to each child's developmental progress and specific learning requirements. AI's contribution to personalised therapy is particularly important in helping children with ASD acquire social and emotional skills within structured and supportive settings. Data-driven AI models that predict the most appropriate intervention strategies for individual needs represent a valuable tool, as noted by Naser et al. (2021). Extending this line of work, Liu and Sun (2024) explored the potential of AI-assisted remote interventions to offer consistent, personalised support beyond the clinical setting, thereby improving accessibility and providing continued assistance to families.

The application of AI in SST for children with ASD offers significant potential for enhancing early psychological support. The studies reviewed examined how AI technologies can address the unique challenges faced by children with ASD in improving their communication and social capabilities. Tang et al. (2024) provided an example through the development of Emoeden, an AI-based tool designed to assist children in recognising and responding appropriately to emotional cues, an essential skill for effective social interaction. This finding aligns with Iannone and Giansanti (2023), who identified the ability of AI to deliver customised interventions that meet individual needs while addressing limitations associated with traditional ASD care approaches. The importance of AI in enhancing empathetic communication was further demonstrated by Koegel et al. (2025), who showed that AI systems can generate empathetic responses that contribute to improved social exchanges. Such applications are particularly valuable in promoting more authentic and meaningful interactions between children with ASD and those around them. In support of this, Hussein et al. (2025) discussed how AI technologies can assist educators in adapting teaching strategies to meet the diverse

learning requirements of children with ASD, making the acquisition of social skills both attainable and engaging.

Conclusion

The present study examines the transformative potential of AI in strengthening early psychological interventions for pre-schoolers with ASD, particularly in the domain of SST. The systematic literature review highlights that various AI applications, including VR, ML, and interactive systems, are effective in providing children with ASD with personalised, adaptive, and engaging learning environments. AI-supported interventions contribute to improved social engagement, facilitate emotional development, and encourage positive behavioural changes by delivering real-time feedback and dynamic learning experiences tailored to individual needs. Tools such as Emoeden, for instance, have demonstrated the capacity of AI to offer targeted emotional learning activities that address specific developmental requirements. Nevertheless, significant challenges persist regarding accessibility, cultural adaptation, sustainability, and the alignment of AI technologies with established therapeutic practices.

Future Directions

Future research should focus on advancing AI tools to enhance their cultural adaptability and ensure they are accessible across a wide range of socioeconomic contexts. It is equally important to explore how the integration of AI-supported interventions with established therapies, such as behavioural and speech therapy, might strengthen their overall effectiveness. In addition, longitudinal investigations are essential to assess the sustained impact of AI-based interventions on the social skills development of children with ASD, particularly in real-world environments beyond controlled research settings.

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